

REMARKS

Claims 1-2, 4-5 and 7 are all the claims pending in the application. Claim 1 has been amended to incorporate the subject matter of claim 3, which has been canceled.

Entry of the above amendments is respectfully requested.

I. Response to Rejection of Claims 1, 2, 4, 5, and 7 under 35 U.S.C. § 102/103

Claims 1, 2, 4, 5 and 7 are rejected under 35 U.S.C. § 102(a/e) as allegedly being anticipated by, or in the alternative, under 35 U.S.C. § 103(a) as allegedly being obvious over Agarwal (US 6,833,073/US 2003/0066796).

Applicants respectfully traverse the rejection.

Claim 1 is directed to a process for producing a composite semipermeable membrane which comprises forming on a surface of a porous supporting film a thin film comprising a polyamide resin obtained by reacting a polyfunctional amine ingredient with a polyfunctional acid ingredient in the presence of at least an alkali metal hydroxide and an organic acid, wherein the polyfunctional amine ingredient is aromatic or aliphatic, wherein the ratio of the normality of the alkali metal hydroxide to that of the organic acid to be mixed therewith (alkali metal hydroxide/organic acid) is from 1.2/1 to 0.9/1 and the thin film is heated to 100°C or higher.

Agarwal is cited as teaching a process for making a semipermeable membrane over a polysulfone porous film.

Agarwal does not disclose that the ratio of the normality of alkali metal hydroxide to organic acid is from 1.2/1 to 0.9/1. However, the Examiner takes the position that such ratio is taught since Agarwal discloses the use of sodium propionate which is obtained by reacting one equivalent of sodium hydroxide and one equivalent of propionic acid, and thus discloses a ratio of 1:1 (which is within the claimed range).

Claim 1 recites that the ratio of the normality of the alkali metal hydroxide to that of the organic acid is from 1.2/1 to 0.9/1. Agarwal does not discuss the normality of sodium hydroxide, propionic acid, or sodium propionate. In addition, Agarwal does not disclose the desired pH for the solution. Further, the pH would not only depend on the amount, but also on the normality, of alkali metal hydroxide and organic acid used. Therefore, one of ordinary skill in the art would not necessarily use the claimed ratio of normality of sodium hydroxide and propionic acid based on the disclosure of Agarwal.

For at least the above reasons, it is respectfully submitted that Agarwal does not anticipate or render obvious claim 1.

Further, each of claims 2, 4, 5 and 7 depend, directly or indirectly, from claim 1. Thus, it is respectfully submitted that these claims are patentable over Agarwal for at least the same reasons as claim 1.

In view of the above, withdrawal of the rejection is respectfully requested.

II. Response to Rejection of Claim 3 under 35 U.S.C. 103(a)

Claim 3 is rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Agarwal, and further in view of Hirose or Tomaschke.

Applicants respectfully traverse the rejection.

The Examiner asserts that Hirose and Tomaschke disclose the heating temperature of 100°C or higher and therefore, it is obvious to one of ordinary skill in the art to combine the teaching of Agarwal with teaching of Hirose and/or Tomaschke.

Applicants respectfully disagree.

It is submitted that the films of Agarwal cannot be dried at 100°C or higher as recited in amended claim 1. In Agarwal, no surfactant is disclosed although a propionic salt and the like are disclosed as additives to be added to an amine solution. Therefore,

the difficult to uniformly apply the amine solution on a hydrophobic polysulfone substrate is generally known (and a semipermeable membrane as disclosed in the present application will not be obtained).

Agarwal, however, discloses that polyvinylpyrrolidone, which is a hydrophilic polymer, is added during preparation of the polysulfone substrate, and it is believed that the application of the amine solution is enabled (*i.e.*, hydrophilic nature is achieved) by the presence of polyvinylpyrrolidone despite the fact that no surfactant is added to the amine solution. For such application, the presence of polyvinylpyrrolidone in the substrate is necessary, which means that sufficient washing with water or the like is not performed during the preparation of the substrate.

In other words, if the substrate is not washed or not sufficiently washed for the purpose of keeping hydrophilic polyvinylpyrrolidone in hydrophobic polysulfone, it is considered that a large amount of a solvent (dimethylformamide in this case) having a higher concentration than polysulfone and polyvinylpyrrolidone remains in the substrate.

If the polyamide film is formed on the polysulfone substrate followed by heating to 100°C or more, dimethylformamide (boiling point: 153°C) is condensed in the substrate without being evaporated although the moisture is evaporated. In such case, polysulfone in the substrate is re-dissolved by condensed dimethylformamide to be a film (nearly equal to a reduction in number of pores), and a resistance in allowing permeation of water is considerably increased, thereby failing to achieve a high water permeation or resulting in no water permeation.

Therefore, it is considered that, in the method of Agarwal, drying is not performed in order to avoid condensation of dimethylformamide, or it is necessary to perform drying at a temperature at which water is not evaporated, *i.e.*, at less than 100°C.

On the other hand, since it is necessary to perform the heating at a high temperature in the present application, sodium lauryl sulfate, which is a surfactant, is added in order to eliminate the solvent in the substrate, as well as to uniformly apply the amine solution on the polysulfone substrate.

In view of the above, it is respectfully submitted that claim 1 is neither taught nor suggested by the cited references and that claim 1 is patentable over the cited references.

Accordingly, withdrawal of the rejections is respectfully requested.

III. Response to Rejection of Claims 1-5 and 7 under 35 U.S.C. § 103(a)

Claims 1-5 and 7 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over W099/01208 (US equivalent to Hirose (US 6,723,422)).

Applicants respectfully traverse the rejection.

The Examiner asserts that since the reference teaches pH which significantly overlaps the range claimed, the ratio of the sodium hydroxide to organic acid also would be inherently in the same range, or overlapping the range as claimed. Thus, the Examiner asserts that it would also be obvious to one of ordinary skill in the art at the time of invention to have the alkali/organic acid ratio in the range to maintain the pH at the desired range.

As discussed above, claim 1 recites that the ratio of the normality of the alkali metal hydroxide to that of the organic acid is from 1.2/1 to 0.9/1. Hirose does not disclose anything about the normality of the acid or sodium hydroxide that can be used. Thus, one of ordinary skill in the art would not necessarily use the claimed ratio of normality of sodium hydroxide and acid based on the disclosure of Hirose.

In addition, Hirose discloses that a layer is formed on a porous support by coating the support with a solution A (comprising one or more polyfunctional amines), then this layer is contacted with solution B (comprising one or more polyfunctional acid halide compounds) and

further contacted with solution C (comprising polyfunctional acid halide compounds) to form a polyamide skin layer on the porous support.

Hirose discloses that the layer containing the polyfunctional amine(s) is contacted with solution B and C in order/to form a polyamide skin layer. *See* col. 2, lines 42-54. In addition, Hirose discloses that after contact with solution C to form the polyamide skin layer, the layer can be contacted with at least either an acidic aqueous solution or an alkaline aqueous solution.

Thus, Hirose does not disclose reacting a polyfunctional amine ingredient with a polyfunctional acid ingredient in the presence of at least an alkali metal hydroxide and an organic acid, as recited in claim 1.

For at least the above reasons, it is respectfully submitted that claim 1 is patentable over Hirose.

Furthermore, each of claims 2, 4-5 and 7 depend, directly or indirectly from claim 1. Thus, it is respectfully submitted that these claims are patentable for at least the same reasons as claim 1.

Accordingly, withdrawal of the rejections is respectfully requested.

IV. Response to Rejection of Claims 1-5 and 7 under 35 U.S.C. § 102(b)

Claims 1-5 and 7 are rejected under 35 U.S.C. §102(b) as allegedly being anticipated by, or in the alternative, under 35 U.S.C. §103(a) as allegedly being obvious over, Tomaschke (US 6,464,873).

Applicants respectfully traverse the rejection.

The Examiner asserts that camphor sulfonic acid is an organic acid and that acidity in an acid is caused by hydronium ions when the acid dissociates in water, which is true whether the acid is organic or mineral. Specifically, the Examiner asserts that TEACSA is hydrolyzed in water to form camphor sulfonic acid.

Applicants respectfully disagree. It is submitted that Tomaschke does not disclose the use of an organic acid or the claimed ratio of normality of the alkali metal hydroxide and organic acid.

Since TEACSA and sodium hydroxide is used in the Example of Tomaschke, the pH of the solution is 12.75 (*see* column 9, lines 65-66). Under this environment (*i.e.*, a strong alkali condition), TEACSA is considered to be existed as a salt (TEACSA as is, not separate to camphorsulfonic acid and triethylamine). Therefore, Tomaschke does not disclose the use of an organic acid.

In addition, since Tomaschke does not disclose the use of an organic acid, it does not disclose the claimed ratio of normality of the alkali metal hydroxide and organic acid.

For at least the above reasons, it is respectfully submitted that claim 1 is patentable over Tomaschke.

Furthermore, each of claims 2, 4-5 and 7 depend, directly or indirectly from claim 1. Thus, it is respectfully submitted that these claims are patentable for at least the same reasons as claim 1.

Accordingly, withdrawal of the rejections is respectfully requested.

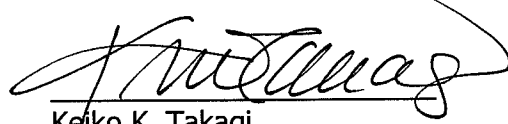
V. Conclusion

In view of the above, reconsideration and allowance of claims 1-2, 4-5 and 7 is respectfully requested.

If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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